points in the center of the panels where the flow impermeability conditions are satisfied. The piecewise constant source and doublet singularities are distributed on a sceleton surface inside the wing. A hard wake model is used to satisfy Zhukovskiy- Kutta condition on the trailing edge of the wing. To model the compressible effects a field mesh, containing the whole wing, is introduced. Intensity of the field sources are also assumed to be piecewise constant. The problem of calculating transonic flow over the wing is reduced to solving a nonlinear integral differential equations. Artificial viscosity concept is used to stabilize the solution in the transonic case.

Test calculations for the wings with NACA series profiles and ONERA swept wing are performed to confirm the validity of the method.

To reduce the transonic shock intensity a parametric optimization of the wing shape is performed. Namely, a local 3D bump [2] is introduced on the surface of the wing. Position and the height of the bump are optimized to improve thransonic characteristics of a wing for a given range of free stream Mach numbers.

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S. A. Grigorian, R. N. Gumerov (Kazan)

A CRITERION OF TRIVIALITY FOR FINITE-SHEETED COVERINGS OF COMPACT CONNECTED ABELIAN GROUPS

In the study of algebraic equations in complex function algebras, it is a standard technique to consider the functions as being defined on the maximal ideal space and to use coverings of the spectrum of the algebra. In particular, we have to do with finite-sheeted coverings of topological groups.

Let G be a connected compact abelian group and let $\hat{G}$ be its additive dual group. For each integer $m \in Z$ we have a homomorphism

$$\hat{G} \to \hat{G} : \chi \mapsto m\chi,$$

where $\chi \in \hat{G}$. We say that $\hat{G}$ *admits division by* m, if this homomorphism is an automorphism.

Let $p : X \to G$ be an n-fold covering of G by a topological space X. As usual, we say that this covering is trivial if the covering space X is homeomorphic to the topological space consisting of n disjoint copies of G. The following criterion of triviality of n-fold coverings of compact connected abelian groups is obtained.

Theorem. *An n-fold covering of a compact connected abelian group G by a connected Hausdorff topological space is trivial if and only if the dual group $\hat{G}$ admits division by $n!$.*

Now we consider an algebraic equation in the Banach algebra $C(G)$ of all continuous functions on the group G, namely,

$$x^n + f_1 x^{n-1} + \ldots + f_n = 0,$$

where $f_1, \ldots, f_n$ are arbitrary elements of $C(G)$. It is well-known that the discriminant of the polynomial $p(x) = x^n + f_1 x^{n-1} + \ldots + f_n$ corresponding to the considering equation is an element of $C(G)$. It is also called the discriminant of the equation. Let us denote by I_n a collection of all algebraic equations of degree n with coefficients in the Banach algebra $C(G)$ whose discriminants are invertible elements of $C(G)$.

Corollary (see [1]). *Each equation in I_n has n distinct continuous solutions if and only if the dual group $\hat{G}$ admits division by $n!$.*

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ON COVERING GROUPS OF COMPACT SOLENOIDS

The questions considered in this report arose in the study of algebraic equations with coefficients in Banach algebras of generalized analytic functions. In this case one deals with solenoidal groups (see, e.g., [1]) and their coverings. Throughout $p : X \to G$ is an n-fold covering of a compact solenoidal group G by a connected topological space X. It turns out that there exists a morphism in the category of topological groups which is transformed by the forgetful functor between the categories of topological groups and spaces into p.

The problem on the existence of a group structure in a covering space of a topological group is also motivated by the well-known theorem on covering groups in algebraic topology [3,§51]. But we assume neither arcwise connectedness nor local connectedness of considering spaces.

Recall that, by the definition of a solenoidal group, there is a continuous homomorphism τ from the additive group of the real numbers R into G such that an one-parameter subgroup $\tau(R) = \{g_t \in G/t \in R\}$ is dense in G. So that, for any element $g \in G$, there exists a dense curve $\{gg_t/t \in R\}$ in G. Using the lifting path lemma, for each $x \in X$ we obtain a curve $\{T_t(x)/t \in R\}$ in X such that $pT_t(x) = p(x)g_t$ and $T_0(x) = x$. We also have a homeomorphism

$$T_t : X \to X : x \mapsto T_t(x)$$

for each $t \in R$.

To introduce the desired multiplication in X we need to study certain properties of the homeomorphisms T_t's. (For details we refer to [2]). In proving the theorem on covering groups the following